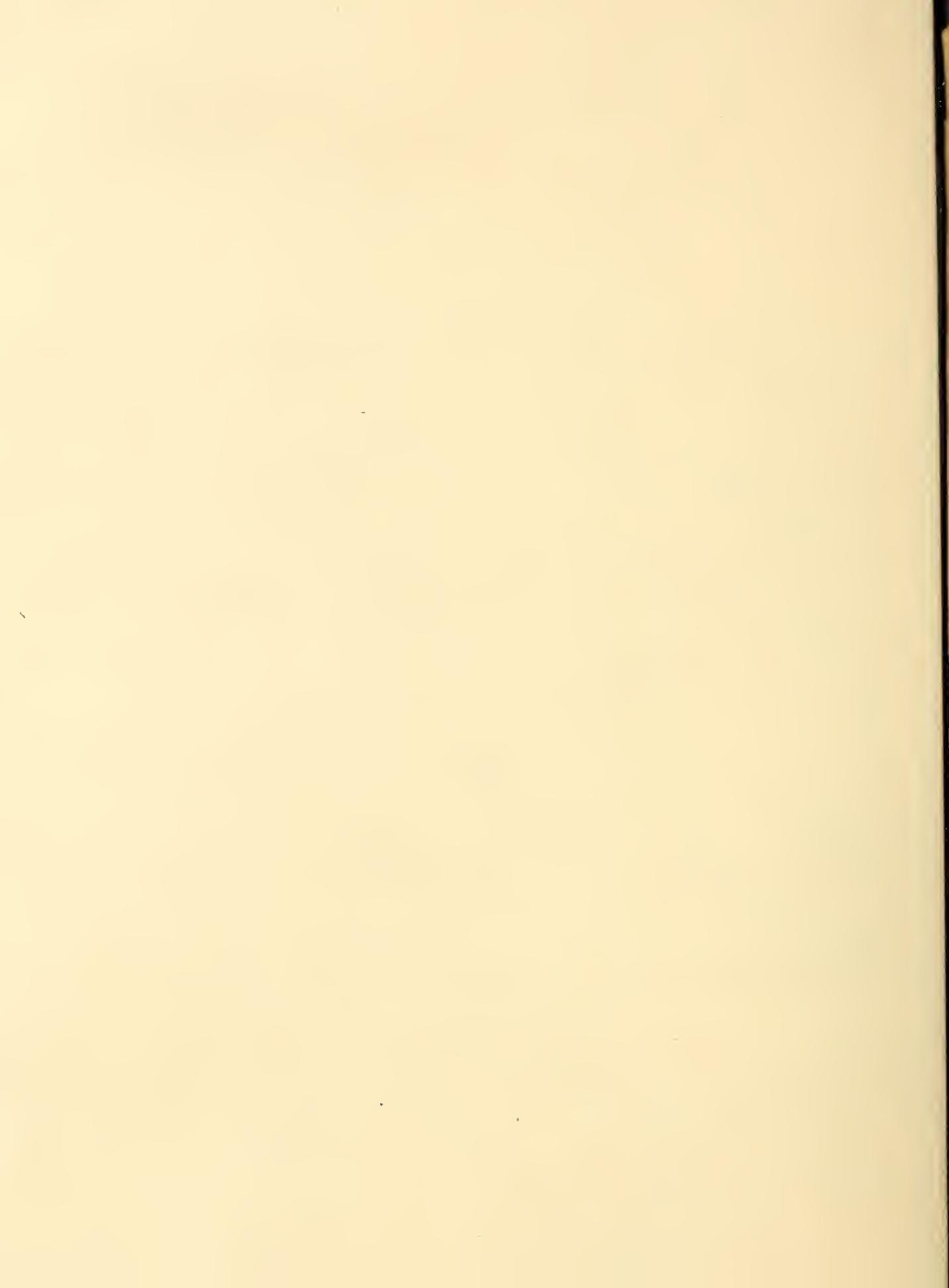


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UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Summary Review of Monthly Reports*

for

SOIL CONSERVATION SERVICE RESEARCH

JANUARY 1946

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EROSION CONTROL PRACTICES DIVISION

Surface Residues Reduce Soil Loss and Runoff - Glenn M. Horner, Pullman, Washington. - "The effect of tillage and the amount of straw utilized as a surface mulch on erosion losses is shown by the effects of the storm of December 27-28. During this storm 2.02 inches of rain fell during a period of 30 hours with maximum intensities of 0.96 inch per hour for a 5-minute period and 0.70 inch per hour for a 30-minute period. Soil and water losses given below are from plots which were summer fallowed in 1945 and seeded to winter wheat."

Initial tillage for fallow	Straw re- turned per acre	Soil loss per acre			Water loss
		Tons	Tons	Inches	
Subsurface tiller.....	0 (burned)	27.0	...	1.18	58
Subsurface tiller.....	1	8.748	24
Subsurface tiller.....	2	0.919	9
Moldboard plow.....	0 (burned)	37.4	...	1.24	61
Moldboard plow.....	1	35.2	...	1.25	62
Moldboard plow.....	2	35.1	...	1.34	66

"The utilization of straw as a surface mulch by means of subsurface tillage greatly reduced the amount of soil and water losses. The function of the mulch in maintaining a higher infiltration rate is shown by the small water loss on the plots which were subsurface tilled with two tons of straw returned as compared to the moldboard plowed plots. The effectiveness of the mulch was proportional to the amount of straw utilized. No appreciable reduction of erosion losses was obtained by plowing under one or two tons of straw."

Stubble Mulch Reduces Wind Damage - Charles J. Whitfield, Amarillo, Texas. - "Interest in stubble mulch tillage is increasing steadily. Field observations show that this practice is effectively resisting erosion. Recently, the worst dust storm in 10 years hit southwest Kansas, damaging wheat, but according to reports, 'stubble mulched fields held.'"

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**All Research work of the Soil Conservation Service is in cooperation with the various State Experiment Stations.

Soil Moisture in Pastures by Species of Grass and Degree of Grazing.—"Soil moisture samples on five selected pastures that will be grazed in 1946 were taken during the month. These samples were taken in an effort to predict forage production, carrying capacity, and the influence of soil moisture on the growth and chemical analysis of five of the more common grass species. Due to low precipitation, soil moisture conditions are poor at this time. During the past four months, precipitation has been 3.45 inches below normal. The fair moisture in the first foot of soil, as shown in the following table, is largely due to the .55 inch of moisture received in the form of snow in January and moisture stored from September rains. Moisture conditions at this time compare very closely to conditions at the beginning of the 1945 season. Forage production was low during the spring and early summer of 1945.

"Soil Moisture Conditions on Pastures, 1945-46

Type of pasture	Date sampled	Depth sampled			
		0-6"	6-12"	12-24"	24-36"
Per cent of moisture					
Native blue grama-buffalo...	1/30/46	20.5*	21.0	16.8	12.5
Moderately grazed.....	3/30/45	17.9	24.9	16.9	11.7
Native blue grama-buffalo...	1/30/46	19.9	18.4	12.6	11.4
Heavily grazed.....					
Mixture-reseeded warm.....	1/30/46	17.0	15.0	13.0	11.2
and cool season grasses...	3/30/45	10.6	19.9	14.4	11.4
Western wheatgrass.....	1/30/46	20.0	15.6	13.3	11.4
	3/30/45	10.6	16.1	13.7	11.5
Crested wheatgrass.....	1/30/46	16.6	13.7	13.7	12.8
	1/30/45	7.9	11.0	14.7	12.9

*Field capacity 30 to 35 per cent.

"The moderately grazed native blue grama-buffalo pasture had the most moisture. This pasture has the greatest penetration of moisture - 18 inches. The moderately grazed pasture also had more moisture in 1945 and produced more grass than the heavily grazed pasture. Pastures with the cool season grasses in pure stands or in mixtures with the warm season grasses have less stored moisture than native blue grama-buffalo pastures.

Steer Gains in January on Grass vs. Ground Sorghum Bundles.—"Heavy steers carried over and grazing on dry grass supplemented with 3-1/2 pounds of cake daily during January showed a gain of .19 pound per head daily. The average weight of these steers on February 1 was 993 pounds. Steer calves grazing dry grass, supplemented with 2 pounds of cake daily made an average daily gain of .29 pound, their weight averaging 505.5 pounds per head. These low gains for both heavy steers and steer calves for the period January 1 to February 1 are probably the result of the inclement weather during the latter part of the month. Ten head of heavy steers fed ground sorghum bundles with a light amount of supplement for this 31-day period showed a loss of .48 pound per day, while a representative sample, 10 head, taken from 90 head of steer calves on the same feed showed a gain of .19 per day. Although the heavy steers made no gain they are in a thrifty condition, showing satisfactory bloom."

Fertilizing Mountain Meadows - Bruno Klinger, Fort Collins, Colorado.

"Yields of hay from fertilized plots in mountain meadows are shown below. Trials were made in two different areas: (1) in the vicinity of Westcliffe in Custer County, and (2) in the vicinity of Hayden in Routt County. In both areas considerable variation existed in yield of samples from the same plot, and in yields from different plots treated with the same fertilizer. Some of these variations resulted from uneven distribution of irrigation water, while others were apparently caused by uncontrolled flow of water early in the season.

"Meadows in the Hayden area contain a better stand of hay-producing grasses and clovers. Those at Westcliffe appear wholly or in part to be in need of renovation and of seeding. In both areas, the highest yields were had from plots treated with fertilizer containing only nitrogen.

"Yields of Meadow Hay from Fertilized Plots, 1945

Fertilizer applied	Application per acre	Yield of hay	
		Westcliffe, Colorado ^a	Hayden, Colorado ^d
	Pounds	Pounds per acre	
N.....	67	2,695	4,474
N.....	40	2,909	4,175
N-P.....	20-40	2,551	3,787
N-P-K.....	10-30-10	1,956	3,552
P.....	86	2,379	3,444
P.....	40	1,842	3,105
N-P-K.....	10-30-10 and hydrated lime.....	1,509 ^b	
N-P-K.....	10-30-10 and ground limestone.....	2,122 ^c	
Hydrated lime.....	1,000	1,930 ^b	
Ground limestone.....	1,000	2,296 ^c	
N-P-K.....	10-30-10 and hydrated lime.....	500	3,245 ^e
Hydrated lime.....	500		2,898 ^e
No fertilizer.....		2,326	3,216

a. Data are from 3 plots except when stated otherwise.

b. Data are from 1 plot.

c. Data are from 2 plots.

d. Data are from 5 plots, except when stated otherwise.

e. Data are from 3 plots."

Runoff and Soil Loss in 1945 by Crops and Tillage Methods - F. L. Duley, Lincoln, Nebraska.-"The cool, wet spring of 1945 gave an abundance of soil moisture for crops, but fortunately there were no torrential rains. As a result, the runoff and erosion were lower than in some years with less total precipitation. The runoff and erosion for several field conditions are shown in the following table:

Crop	Previous cover	Tillage	Runoff	Erosion
			Inches	Tons per acre
Oats.....	Cornstalks	Subtilled	.35	.47
Oats.....	None	Disked	2.42	7.86
Wheat.....	Oats straw	Subtilled	.11	.08
Wheat.....	None	Plowed	.31	.13
Corn.....	Wheat straw	Subtilled	.75	1.67
Corn.....	Wheat straw	Plowed	1.82	13.00
Corn.....	None	Plowed	1.89	8.11

"The runoff and erosion from wheat land was extremely low this year, because the wheat was well advanced before the heavier rains came. The high runoff from oats land was due to the very slow start which the oats made. They did not get large enough to protect ground until very late and thus allowed the soil to become compact at surface. However, they finally grew out and made fairly good yields.

Ligno-Cellulose Decomposed by Fungi.--"The ability of certain fungi to attack ligno-cellulose obtained from hydrolyzed wood was observed. The ligno-cellulose contained about 56 per cent lignin and was acid in reaction (pH 4). The fungi used included 2 strains of acid tolerant Aspergilli, an acid-susceptible Chaetomium, and two strains of Trichoderma.

"The ligno-cellulose proved very resistant to decomposition by all the fungi used. The Aspergilli and Trichoderma showed slightly more decomposition activity than the remaining fungi. Chaetomium was the least active but its activity was doubled by neutralizing the acidity."

Highest Organic Matter on Grazed Areas - D. D. Smith, Columbia, Missouri.--"Determinations were made during the month of the organic matter content of the grazing study plots, and of 2 rotation study plots. These determinations were made on samples secured after 6 years on the grazing study plots. The plots of the rotation study were started in 1940. Results are as follows:

"Organic Matter Content After 6 Years of Grazing or Cropping,
Putnam Silt Loam Soil, 3 Per Cent Slope

System	Organic matter
Timothy-lespedeza-sweet clover (grazed).....	3.11
Timothy-lespedeza (grazed).....	3.05
Wheat-lespedeza (grazed).....	2.94
Oats-lespedeza (lespedeza grazed).....	2.96
Wheat-lespedeza (grain and hay).....	2.62
Barley-soybeans (barley grazed).....	2.51
Corn-wheat-sweet clover and timothy (grain and hay).....	2.52
Corn-oats (grain).....	2.46

"Highest organic matter content after 6 years of grazing was on the timothy-legume areas. That of small grain-lespedeza was only slightly less. The barley-soybeans system, which has allowed appreciably more erosion, had the lowest organic matter content of all the plots, and only slightly above that of corn-oats system in which there was no meadow, but where the cornstalks were disked into the soil prior to seeding of the oats. The organic matter content of wheat-lespedeza plots where the wheat was removed for grain and the lespedeza for hay, was appreciably lower than from the lespedeza plots, on which both the wheat and lespedeza were grazed."

Plowed-Mulched Plots Outyielded Plowed Plots - C. A. Van Doren, Dixon Springs, Illinois.-"Plots that were plowed and then mulched outyielded similar plots that were plowed and planted to corn with clean tillage at Dixon Springs. The average increased yield on duplicate plots was 10 bushels per acre without nitrogen fertilization and 12.8 bushels with 150 pounds of ammonium sulphate. Corn planting was completed during unfavorable moisture conditions, and stands were inferior on some of the mulched plots. Despite inferior stands on some plots, the subtilled-mulched plots outyielded the plowed-clean-tilled plots without nitrogen fertilization and only slightly underyielded the plowed-clean-tilled plots with ammonium sulphate.

"The mulched plots effectively controlled soil losses during a very wet season. Observations and photographs taken show rills and other evidence of greater soil losses on the clean-tilled plots. Yields in bushels per acre for various tillage and nitrogen treatments are as follows:

	<u>No nitrogen</u>	<u>(NH₄)₂ SO₄</u>
Plowed, clean-tilled..	63.6 Bu/Ac.	63.7 Bu/Ac.
Plowed, mulched.....	73.6 "	76.5 "
Subtilled, mulched....	67.2 "	62.4 "

Pine Trees Make Good Growth in 1945 - J. B. Pope, Tyler, Texas.-"Many of the five-year-old pine trees set out in 1941 are 15 feet in height and 6 and 7 inches in diameter at the ground level. Some of the trees made as much as three feet of growth in height and an inch increase in diameter during the 1945 season."

Flood and Erosion Losses Serious in January - Russell Woodburn, State College, Mississippi.-"January 1946 was the third wettest month of record. Rainfall reached 9.25 inches, or almost twice the 56-year average figure of 4.77 inches. This was the wettest January since 1937 when 9.74 inches of rain fell. The January rainfall record was established in 1925 with 12.90 inches.

"During the January 5-11 period when 4.87 inches of rain fell, runoff from a bare plot on a 9 per cent slope at State College was nearly 100 per cent. Even though these rains were of only moderate intensity, soil loss exceeded 20 tons per acre. Plots with a surface protection of trash from last year's corn crop or with a good stand of vetch lost very little soil.

"Runoff apparently exceeded 100 per cent on the bare plot for several January rains. This has never occurred before but is not entirely unexpected. Seepage channels are known to develop in the heavy prairie clays and associated phenomena have actually been observed in a pasture near the bare plot."

"A terrace of large cross section is located in the pasture less than 25 feet above the upper end of the plot. It is possible that the terrace has cut into a seepage line leading downward toward the plot. Within recent months considerable additional drainage area of an impervious nature has been turned into this terrace upstream from the plot. This large quantity of additional water may be responsible for the trouble, particularly under winter conditions."

Effects of Winter Crops on Tree Size - John T. Bregger, Clemson, South Carolina.-"Tree size data on border trees between plots in the older peach block have been summarized as follows:

Tree location	Number of trees	Average trunk circumference
		Inches
Between vetch plots.....	30	19.2
Between rye plots.....	27	15.6
Between rye and vetch plots.....	24	18.5

"It is clearly indicated that peach trees growing where half the soil area is under a more favorable treatment than the other tend to react more like the trees under the better treatment. In this particular case, the 'half-and-half' treatment is approximately 4/5 of the better treatment. From the standpoint of orcharding, this would indicate that alternate middle cover cropping is practical where a certain crop grown in all middles would materially retard tree growth and fruit production.

Nitrogen in Residues of Orchard Cover Crops.- "Laboratory determinations were made of cover crop residues to ascertain the amount of nitrogen returned to the soil as a result of growing certain summer legumes in the orchard. The data in the following table indicate the high fertility value of several legume species.

Cover crop species	Nitrogen per acre*
	Pounds
Crotolaria spectabilis.....	637
Crotolaria lanceolata.....	378
Crotolaria intermedia.....	273
Soybeans-sudan grass (mixture**)....	335
Kobe lespedeza.....	156

*Expressed in terms of NaNO₃.

**Mixture contained large proportion of soybeans.

"The fertility value of rank growing summer legumes in terms of nitrogen is high....This is evidenced in comparing the amount of nitrogen they contain with 300 pounds of sodium nitrate, the amount of fertilizer often applied by a commercial peach grower."

Intense January Rain - Harold T. Barr, Baton Rouge, Louisiana.- "Soil and water losses were relatively heavy for January. On January 5 a rain of 2.66 inches occurred in 2.25 hours with the first 1" falling in the first 10 minutes. The cover crop has been very slow in growing, measuring only 1-1/2" to 2" in height, and furnished little or no protection. Soil losses varied from 584 to 3,909 pounds per acre and water runoff from .57 to 2.63 inches per acre."

Summer Versus Winter Cover Crops - T. C. Peele, Clemson, South Carolina.- "Crotalaria spectabilis broadcast in corn middles just before the final cultivation produces excellent cover and adequate quantities of seed for volunteer stands in the subsequent crop. Where mulch farming methods and clean tillage practices were used in the production of corn following corn and crotalaria, yields of slightly more than 72 bushels per acre were obtained under both tillage methods. Residues from summer cover crops such as Crotalaria spectabilis and Kobe lespedeza present fewer tillage and insect problems than winter cover crops. The soil under such residues remains loose and mellow and is easily tilled in contrast to the tendency to become dry and hard quickly where winter cover crops are growing.

"The mulch-balk methods was compared with the plowing, clean tillage method with corn following Kobe lespedeza. No significant differences in yields resulted from the different tillage practices. The mulch method appeared to reduce runoff and erosion although these effects were not measured.

Mulch Tillage and Cotton Yields.- "A test comparing mulch farming methods with clean tillage in the production of cotton was started in 1944. The cotton is grown in a four-year rotation consisting of: (1) oats and lespe- deza two years; (2) cotton, vetch and rye; and (3) cotton. Two crops of oats and two crops of cotton will be harvested from each plot in each four-year period. The lespedeza and the vetch and rye are used as sources of plant residues.

"The effects of the mulch practices and clean tillage on the yield of cotton in 1945 are shown below. The figures are averages of four plots in each instance. The yield of cotton where Kobe lespedeza residue was used for mulch was equal to the yield on the clean tillage plots where all of the lespedeza residue was plowed under. Where cotton followed vetch and rye the mulch method gave lower yields than clean tillage. This was probably due to difficulty in securing good soil preparation with mulch treatment as the winter cover crop caused the soil to become dry and hard very quickly. Even though no benefits in cotton yields resulted from the mulch practices, the mulch greatly reduced runoff and erosion.

"Influence of mulch-farming and clean tillage methods
on yields of cotton in 1945

Tillage method	Preceding cover crop	Yield of seed cotton
Mulch, balk.....	Kobe lespedeza	1,137
Plowed, clean cultivation.....	Kobe lespedeza	1,130
Mulch, balk.....	Vetch and rye	912
Plowed, clean cultivation.....	Vetch and rye	1,154
Plowed, clean cultivation.....	None*	1,058

*Second cotton crop on area where Kobe lespedeza was previously grown for several years.

Tillage Methods and Cover Crops Affect Organic Matter Content of Soils. - "Organic matter and nitrogen analyses have been made for soil samples from corn plots with three different tillage methods and two kinds of winter cover crops. Corn is grown every year on each of these plots with a winter cover crop each winter. Comparative analyses of samples collected at the beginning of the experiment and at the end of the 1945 corn growing season are shown below. Excellent growths of vetch and rye were secured on all plots each year but the growth of crimson clover was only moderately good on the sandy plots and rather poor on some of the clay loam plots.

"The increases in organic matter and nitrogen were slightly larger in the mulch tillage method than in the plowing method where all of the residue was turned under. The vetch and rye showed an average increase of 0.31 per cent organic matter for the three-year period. This amounts to approximately 0.1 per cent gain per year, or about one ton oven dry weight per year.

"Our experience with vetch and rye and with crimson clover leads us to the conclusion that vetch and rye is far superior as a winter cover crop. There are 26 plots in this experiment and most of the plots have a sandy loam top soil although a few of them have clay loam top soils. Frost action particularly on the clay loams frequently lifts the clover plants out of the soil thus depleting the stand considerably.

"Soil aggregation data previously reported on these plots showed that the improvement in soil structure was much greater than the proportional increase in organic matter. The organic matter has been very effective in reducing runoff and erosion from corn following vetch and rye even where the vetch and rye was plowed under. The vetch and rye were much more effective in reducing runoff and erosion where they were left on the surface.

"Influence of cover crops and methods of tillage on organic matter and nitrogen contents of soil where corn is grown each year

Cover crop	Tillage method	Organic matter content of soil			Nitrogen content of soil		
		1942 Pct.	1945 Pct.	Increase	1942 Pct.	1945 Pct.	Increase
Vetch and rye.....	Mulch, balk	1.34	1.73	0.39	0.042	0.048	0.006
Vetch and rye.....	Mulch, disk	1.27	1.55	0.28	0.043	0.047	0.004
Vetch and rye.....	Plowed	1.10	1.36	0.26	0.036	0.039	0.003
None.....	Plowed	1.24	1.24	0.00	0.039	0.033	-0.006
Crimson clover.....	Mulch, balk	1.32	1.58	0.26	0.042	0.046	0.004
Crimson clover.....	Mulch, disk	1.59	1.68	0.09	0.048	0.048	0.000
Crimson clover.....	Plowed	1.15	1.13	-0.02	0.037	0.036	-0.001

Pasture Yields Increased by Reseeding and Treatment - Richard M. Smith, Morgantown, West Virginia. - A manuscript covering the pasture reseeding work was completed and sent to the Director for consideration as an Experiment Station Bulletin. Extracts of data for their counties were sent to SCS Field Offices which have cooperated in field trials. A summary of yield and species data for four counties for 1945 are as follows:

County, plot and year	Till, treat and seed		Plow, treat and seed		Treated only		Untreated	
	Yield per acre	Desirable species	Yield per acre	Desirable species	Yield per acre	Desirable species	Yield per acre	Desirable species
Nicholas County	Pounds	Pct.	Pounds	Pct.	Pounds	Pct.	Pounds	Pct.
First year:								
Trial 21.....	918*	29			690	6	312	0
Trial 20.....	2,436*	34			1,896	13	1,272	7
Third year:								
Plot 8.....	842	20	852	18	768	13	410	5
Plot 10.....	1,638	27	1,638	37	1,923	25	1,101	5
Wetzel County								
Third year:								
Plot 4.....	2,092	26	3,204	29	1,728	17		
Plot 5.....	2,662	30	2,328	25	1,629	4		
Hancock County								
First year:								
Plot 19.....	3,576	41			408	0		
Plot 20.....	1,944	38			500+	1		
Second year:								
Plot 15.....	1,698*	26			1,590	1		
Plot 16.....	3,096	39			1,386	10		
Plot 17.....	4,554	35			1,098	0		
Plot 18.....	3,294*	56			498	1		
Greenbrier County								
Second year:								
Plot 12.....	7,554	40			7,482	40		
Third year:								
Plot 6.....	1,283	27	1,020	27	1,272	21	1,145	12
					900	21	646	16

*Early growth only.

+Partly eaten.

"These data illustrate the necessity for considering various factors in pasture seeding recommendations. Conditions and circumstances in the State are so variable that generalizations are difficult. But reseeding is often highly profitable when the local factors are properly evaluated. Our bulletin manuscript attempts to give the essentials for a proper evaluation."

Seven Excessive Rain Storms Cause 85 Per Cent of All 1944 Soil Loss -

John Lamb, Jr., Ithaca, New York.-"In 1944 seven excessive rains, making up 23 per cent of the May-October total caused over 85 per cent of the soil loss; but in 1945, 10 excessive rains, making up 29 per cent of the total, caused only about one-half the soil loss. The year 1944 was moderately dry, while 1945 was extremely wet. Soil losses in the dry year exceeded those in the wet year by 8 times on continuous corn, and 2 times on the fallow. The only one logical explanation seems to be that although fewer excessive rains occurred in 1944, they were of much greater intensity than those in 1945. In general, 1945 intensities were low.

Treatment	Soil loss, May - October 1945		
	Total for period	10 excessive rains for period	Total lost by excessive rains
	Lbs/Acre	Lbs/Acre	Per cent
Fallow.....	15,353	9,080	59
Continuous corn.....	2,251	874	39
Contour potatoes....	25	13	52

Standing Corn Holds the Snow.-"The expression 'as conspicuous as a lighthouse in a fog' is a common one, but a strip of standing corn on a windswept hill-side is even more conspicuous at certain times of the winter. Meadow, pasture, and even grain stubble will not hold much more snow than bare ground, but a strip of corn left standing after husking has consistently caught and held an appreciable depth. This year, at the end of January, with south and west slopes practically bare and east and north slopes nearly so, about 12 inches of snow still lay in a strip of standing corn on a southwest slope. Soil under this was not frozen.

Corn Yields in 1945 Not Reduced by Ryegrass Cover Crop.-"Corn yields given in the December report showed higher corn yields on the plowed plots than on the disked or subsurface tilled plots. Ryegrass seeded on one-half of the plots of this experiment immediately following the last cultivation of corn produced an excellent stand and growth. Although corn yields were slightly less with the cover crop, the effect was not significant this year with adequate to excessive moisture. Neither was there any significant effect of cover crop on size of ear or maturity.

Weeds in Corn Give More Competition for Moisture than Rye Cover Crop.-"Soil moisture at a depth of 6 inches under discing was less than under turn plowing. The explanation probably is to be found in the fact that the disced plots were weedier.

"Moisture under plots with cover crops, however, showed a tendency to be somewhat greater than moisture under plots without cover crop. Apparently, moisture was adequate for both corn and cover crop which makes most of its growth late in the season. Under these conditions, it is possible that the cover crop would provide some slight shade to the soil and reduce soil temperature and movement of wind. This might reduce evaporation. Difference in runoff was not involved in this comparison. It is apparent that there is a difference between the moisture competition provided by weeds and that provided by a ryegrass cover crop."

DRAINAGE AND WATER CONTROL DIVISION

Hydrologic Studies - L. L. Harrold, North Appalachian Experimental Watershed, Coshocton, Ohio.-"Soil-loss data for the year 1945 show that under certain rainfall conditions erosion on wheatland exceeds that on cornland. Wheatland (not manured) lost 8 tons of soil per acre. Cornland (even in straight rows) lost less than 1 ton per acre. During the vulnerable season (May - September) for runoff and soil loss on cornland there was only one storm having over 1 inch of rain falling at rates greater than 1 inch per hour. This is not normal.

"Physical analysis of the soil samples taken on plowed corn watersheds in 1945 are given in the following table:

Changes in Some Physical Properties of Soils
Prior to and Following a Corn Crop, 1945.

Watershed: No.	Date sampled	Soil depth:	Volume: Inches	Total pore space	Solids: Percent	Water : Percent	Air : Percent	Plant residues: lbs/acre
1/ 109	2/ 4-19-45	0-2	1.16	55.3	44.7	28.1	27.2	3,187
	4-19-45	3-6	1.38	47.2	52.9	31.8	15.4	619
	3/ 10-11-45	0-2	1.15	55.1	44.9	24.9	30.2	959
	10-11-45	3-6	1.27	50.6	49.1	28.7	21.9	604
4/ 123	2/ 4-19-45	0-2	1.19	54.1	45.9	34.9	19.3	2,560
	4-19-45	3-6	1.43	44.9	55.1	37.2	7.7	414
	3/ 10-11-45	0-2	1.16	56.4	43.6	30.4	26.0	459
	10-11-45	3-6	1.36	48.8	51.2	36.3	12.5	487

1/ Muskingum silt loam.

3/ After corn was cut and prior
to tillage for wheat.

2/ Prior to tillage for corn.

4/ Keene silt loam.

"Note that there is little difference in the total pore space between watersheds 109 and 123 on the same dates. Yet the difference in volume of air space is much larger. Keene silt loam has a higher clay content than Muskingum silt loam. Total pore space in the 0-2 inch depth was about the same at harvest time as before plowing. Total pore space at the 3-6 inch level increased."

Hydrologic Studies - I. W. Bauer, Central Great Plains Experimental Watershed, Hastings, Nebraska.-"During January the precipitation at the meteorological station was 0.59 inch. This is slightly above normal. The snow that did fall was drifted quite badly by the wind, blocking most of the roads. Some of the drifts were quite black as there was considerable wind erosion from the bare wheat fields.

"Total rainfall and runoff for the year from the plots varies as follows:"

Plot :	Crop	:Rain-:Run-:		Plot :	Crop	:Rain-: Run-	
		:fall	:off			:fall	:off
1H	Meadow	20.32	0.04	6H	Corn contoured	20.11	1.42
22H	"	20.00	.13	7H	" "	20.84	1.09
18H	Pasture	19.75	1.76	9H	Corn, st. rows	20.79	1.47
3H	Oats, st. rows	19.93	3.32	15H	" "	20.12	1.52
16H	" "	20.12	2.27	20H	Corn, subtilled	20.16	1.78
5H	Oats, contoured	20.11	2.59	23H	" "	19.63	1.34
13H	" "	20.24	1.93	1/ 10H	" "	20.79	2.38
1/ 11H	Oats, subtilled	20.79	2.52	8H	Wheat, st. rows	20.11	.49
1/ 14H	" "	20.24	1.93	17H	" "	20.12	1.35
21H	" "	20.16	3.18	19H	Wheat, subtilled	21.67	1.31
22H	" "	19.63	1.63	24H	" "	19.63	.96
				4H	Wheat, contoured	20.11	1.54
				12H	" "	20.79	1.32

1/ 10H, 11H, and 14H - Change from strip crop to subtilage during the year.

The above table was taken from Mr. Bauer's report.

Hydrologic Studies - R. B. Hickok, Lafayette, Indiana.-"I discussed crop-residue-management experiments and contour-field tests at the Indiana Soil Conservation Service Farm Planners and District Conservationists meetings at Purdue on January 28. Mr. Bedell discussed erosion losses from watersheds in a 3-year rotation, at the same meeting.

"Mr. Bedell discussed 'Success of Conservation Farming' at the Purdue Agricultural Conference on January 17. More than 800 people were in attendance at this meeting, sponsored by the Soils and Fertilizer Section of the Purdue Agronomy Department. The basic information presented was from the Purdue-Throckmorton Farm."

Hydrologic Studies - R. G. White, East Lansing, Michigan.-"Run-off figures for the month are shown in the following table:

Date	'Cultivated watersheds'			Wooded watershed	
	Rainfall	Runoff		Rainfall	Runoff
	: "A"	: "B"		:	:
Jan. 4-5	0.40	0.4889	0.6211	0.30	0
Jan. 30-31	.06	.0502	.0619	.08	0
Total for Month	1.58	0.5391	0.6830	1.62	0
Percent Runoff		34.12 %	43.23 %		0 %

"The annual 'January thaw' took place early in the month. On January 1, there was a 3 inch layer of frost in the ground, but this had entirely disappeared by January 7. The soil remained unfrozen until January 16, when frost again entered the soil, and by the end of the month, frost had penetrated past the 6-inch level."

Hydrologic Studies - H. A. Daniel, Cherokee, Oklahoma.-"The conservation value and importance of collecting runoff water from higher sloping land and spreading it onto lower, more level, deep, permeable soil is being studied on the wheat-land conservation experiment station, Cherokee, Okla. This experiment was started in the summer of 1944 by systematically designing and constructing terraces on intervals of 1 foot in a 'syrup pan' (spread and spill) type of arrangement. This forces the water to completely cross the field in the interval between each terrace where much of the surplus is absorbed by the soil and retained for plant use.

"Rainfall has been above normal and the area occupied by the terraces has been completely flooded five times since the experiment was started. Under this method of spreading the excess water for moisture conservation, it was prevented from collecting in the pond that formally developed during rainy seasons in the north west corner of the station. In addition to providing outlets for excess runoff water or valuable wheat and alfalfa land, typical of northwestern Oklahoma, the 'syrup pan' (spread and spill) type terraces may also be used advantageously to prevent excess water from accumulating and standing in ponds and destroying the crops."

Runoff Studies - V. D. Young, Fayetteville, Arkansas.-"There were 8 days during the month of January on which precipitation occurred on the Bentonville watersheds. The mean of six gages was 3.14 inches. Runoff occurred from all of the watersheds except the wooded area and the mixed crop area consisting of standing cornstalks on the upper half and pasture and brush on the lower half. However, all of the peaks were very low.

"There were likewise 8 days during which precipitation occurred on the Muskogee watersheds. The mean precipitation of five gages was 3.91 inches. Runoff occurred from all watersheds. The highest peak rate of 0.193 inches per hour was recorded from the pasture-meadow area W-IV, the lowest from a plowed alfalfa area, W-I. The highest peak rate from Watershed W-II was 0.0708 inches per hour, from Watershed W-III 0.1825 inches per hour and from Watershed W-I, 0.0295 inches per hour. All records are low rates for these watersheds."

Runoff Studies - T. W. Edminster, Blacksburg, Virginia.-"Some additional work was done on the Ridges and Valleys Report. On January 10 the Project Supervisor had an interview in Charlottesville, Va. with Mr. Donald S. Wallace, District Engineer for the United States Geological Survey. Mr. Wallace was extremely interested in the proposed Ridges and Valleys Report in that he felt it should supply much needed data covering the smaller watersheds; a field that his organization was unable to cover effectively at the present time. He offered the project full cooperation in turning over any and all data from the few small watersheds under the administration of the United States Geological Survey. Part of these data are now in the project office; the remainder is being compiled and will be sent to the project within the next few weeks.

"On January 22, the Project Supervisor, together with Mr. C. E. Seitz, Head, Department of Agricultural Engineering; Mr. James B. Lillard, Associate Agricultural Engineer, Extension Service; and Mr. R. E. McKnight, Assistant Agricultural Engineer, Extension Service, drove to the TVA headquarters in Knoxville, Tenn. Through the cooperation of Mr. A. S. Fry, Chief, Hydraulic Data Division, the Project Supervisor was able to transcribe the peak rates of flow from four of the Thompson Creek watershed areas. These areas supply peak rate data for watersheds ranging between 1 and 3 square miles in extent. It is planned to start some preliminary analysis of these data during February.

"While in Knoxville time was also spent in a conference dealing with the revision of the Thompson Creek Hydrologic Research Project located in Russell County. It is planned to once again bring the TVA Research Program in that area under the direction of the Virginia Agricultural Experiment Station. Under such an arrangement the Thompson Creek Project will be allied with the present hydrologic research program.

"The following table shows the comparative inches of surface runoff from contour-furrow-pasture plots during the period of 1942-45. It will be noted that the 1945 yields were extremely low. The absence of high intensity storms, especially following an extended rainy period was the cause of this.

Year	Total Runoff in Inches			
	Untreated	Fertilized	Furrowed	Fert. & Furr.
	Inches	Inches	Inches	Inches
1942	3.66	5.25	0.67	0.58
1943	6.32	7.58	2.82	1.66
1944	1.48	2.48	.59	.33
1945	0.08	0.14	.00	.00
Total	11.54	15.48	4.08	2.57
Average	2.88	3.87	1.02	0.64

"The following table summarizes the total soil and water losses from the Blacksburg control plots during 1945. The totals are compared to the 9-year averages.

Slope	Crop	Soil loss - Tons/A.		Water loss - In.	
		1945	9 Yr. Avg.	1945	9 Yr. Avg.
<u>Percent</u>					
5	Corn	0.06	4.52	0.34	1.66
	Wheat	.00	.54	.00	1.04
	Clover	.00	.02	.00	.16
10	Corn	.57	9.50	.65	2.57
	Wheat	.30	1.45	.67	1.89
	Clover	.72	.14	.89	1.97
15	Corn	4.12	14.64	.89	1.97
	Wheat	.00	.86	.00	.93
	Clover	.00	.02	.00	.14
20	Corn	4.23	15.20	1.54	2.32
	Wheat	.00	.48	.00	.86
	Clover	.00	.03	.00	.43
25	Corn	7.22	20.53	1.82	2.48
	Wheat	1.34	.92	.32	1.02
	Clover	.00	.01	.00	.12

"Low intensity storms resulted in extremely low soil and water losses during 1945. Contour cultivation was able to hold the major portion of the surface water."

Hydraulic Studies - F. W. Blaisdell, Minneapolis, Minnesota.- "Mr. Anderson made a detailed analysis of several pipe bleeder tests. A 'synthetic' pressure diagram was computed for the period during which the pipe becomes sealed off. The diagram is synthetic because we have only two pressure recorders to record the pressure at 20 piezometers. One piezometer used as a control is continuously connected to one recorder. The other recorder is successively connected to the other piezometers, and records are obtained until similar occurrences appear on the control recorder while the remaining recorder is connected to each of the other piezometers. The records are then analyzed and combined to give a simultaneous picture of the pressures at each piezometer. From these plots the hydraulic grade line was plotted at short intervals to give a picture of the variations with time of the pressures existing during the sealing of the pipe. This plotting started with the pipe flowing as an open channel. As the riser level increased, thus causing greater turbulence below the junction of the riser and pipe, the pipe became filled or sealed for a distance of several diameters. The seal would generally break up by the time it reached the middle of the pipe but occasionally the seal would flow down the entire length of pipe. As the seal forms, the hydraulic grade line is lowered, and this lowering follows the seal down the pipe. When the seal reaches the end of the pipe, the entire hydraulic grade line is below the bottom of the pipe. After the seal leaves the pipe, the hydraulic grade line rises suddenly to the free flow level. Five runs were made in the range of pipe flow (pipe flowing full). A maximum discharge of 1.34 cfs was obtained for the 4-1/2 inch pipe. At this flow the system was stable. The average loss in head through the riser and for a distance of two pipe diameters down the barrel is approximately $0.8V^2/2g$ for this condition. Negative pressures greater than 4 feet of water were observed at the top of the barrel, a distance of 1/2 pipe diameter downstream from the riser. The fall in the barrel is 2.24 feet, the excess of negative pressure being due to curvature of the stream line at the entrance to the barrel.

"At my request and prior to his visit on December 27 and 28, Mr. Culp discussed with Mr. Freyburger, Chief of the Regional Engineering Division, the hydraulic problems on which they desire additional information. Although we are not yet in a position to begin the tests, we wished to have the information at hand so we could make our plans and begin the tests without delay as soon as manpower becomes available. Their list follows. The order is the priority to which they have assigned the several problems on which they desire information.

1. Submergence data on box-inlet-drop spillways
(Rectangular spillways).
2. Modification of the SAF outlet for the condition where the floor of the outlet must be kept at the grade of the downstream channel and where the available tail-water is low. It was also suggested that additional consideration be given to the Schoklitsch energy dissipator.

3. Water surface profiles through reinforced concrete chutes. Due to the peculiar flow conditions existing in chutes where a rectangular spillway is used as the entrance arrangement, there is considerable uncertainty as to the water surface profile at the entrance to these chutes.
4. A new type of inlet for reinforced concrete-drop inlets which has been developed by Mr. Culp to facilitate construction. Information is desired on internal pressures, discharge characteristics, and the losses at the entrance, elbow, and in the riser.
5. Propped outlets for pipe-drop inlets or pipe bleeders. Information is desired on the effect of this outlet on the discharge characteristics of the pipe-drop inlet and on the scour pattern in the sand bed below the outlet with different tailwater elevations."

Hydraulic Studies - C. W. Lauritzen, Logan, Utah.-"The publication entitled 'Soil Erosion in Small Irrigation Furrows' appeared in January as Utah Agricultural Experiment Station Bulletin No. 320."

Hydraulic Studies - A. W. Marsh, Corvallis, Oregon.-"Five tons per acre of manure were found to be quite ineffective in improving infiltration capacity and increasing yields as compared to the 20 tons used in 1944. Field applications of sulfur at 2,000 lbs. per acre did not have the depressive effect on both yield and infiltration that 6,000 lbs. did. Greenhouse and laboratory studies showed that 6,000 lbs. of sulfur greatly increased percolation rates after 300 days of incubation but depressed growth. Where ground alfalfa was added growth was increased. Trough or flume controlled water distribution increased yields and reduced runoff losses as compared to ordinary shovel control. Land leveling always leaves scraped spots where subsoil is exposed. Infiltration tests showed that the scraped soil had only 60 percent of the infiltration capacity of the unscraped soil."

Hydraulic Studies - Stephen J. Mech, Prosser, Washington.-"A paper entitled 'Critical Analysis of Erosion Under Furrow Irrigation' was submitted to the Chief of Research and a limited number of others for criticism and review. This paper consists of an analysis of the erosion problem under furrow irrigation in view of the experimental results to date."

Hydraulic Studies - Vito A. Vanoni, California Institute of Technology, Pasadena, California.-"Tests were completed on a model of the Lake Wedington Spillway. The floor and one wall of this spillway are to be excavated from hard rock, thus leaving relatively rough surfaces. In order to reduce the rock excavation to a minimum, it is desirable to use a flat slope for the spillway. One of the important features of the test was to determine the minimum slope that could be used without causing a jump in the spillway due to backwater. The model was run with a smooth surface corresponding to a Manning's n of about 0.015 and with the bottom and one wall roughened with fine gravel to give a Manning's n corresponding to about 0.033. The latter roughness value is the estimated roughness for the rock. The model study showed that with the

higher roughness and a spillway slope of 2-1/2 percent, no jump would occur in the spillway.

"Tests on a model of Lake Coffee Mill Spillway Plan IV were started. The preliminary report covering the conclusions and recommendations on the tests of Lower Caney Lake Spillway Plan III were submitted to the Fort Worth office."

Drainage Studies - M. H. Gallatin, Homestead, Florida.-"Water tables for the month in the interior have dropped about 0.7 of a foot while out toward the coast the water table dropped about 0.3 of a foot. The water table at well No. 1 located on Redland Road about 10-1/2 miles west of Biscayne Bay was 1.42 feet above mean sea level on January 29, 1946.

"Well No. 31 located on Mowry Street 8 miles west of Biscayne Bay was 1.58 above mean sea level on January 29, 1946.

"Well No. 25 located on Eureka Drive east of Peters, Fla., 2-1/2 miles was 3.34 feet above mean sea level on January 29, 1946.

"At the rate the water table is dropping, minus readings in the general water table can be expected."

"Sampling along five of the major canals coming into the marl area east and north of Homestead show that the heavy intrusion of chlorides extend back 2-1/2 to 3 miles from the coast. From this point inland the amount of chlorides drop very fast.

"Chlorides in the cultivated area are increasing. This is brought on by lack of rain and excessive dropping of the general water table in the area."

IRRIGATION DIVISION

Evapo-Transpiration Losses Affecting Irrigation - Salinas Valley, Calif..-Paul A. Ewing completed his chapter on Irrigation Practice for the report of the State Engineer of California regarding utilization of the water supply of the lower portion of the valley. Summary tabulation shows average irrigation deliveries to the major areas surveyed as follows: Pressure, 2.07 acre-feet per acre; Eastside, 2.19; Forebay, 3.25; Arroyo Seco, 3.24; Total area, 2.52. These amounts will be used in comparison with consumptive-use figures calculated by Mr. Blaney (see below).

Harry F. Blaney reports completion of calculation of unit values of consumptive use for different crops in the four major areas in Salinas Valley. The study indicates that the 2 years included in the study were close to normal. The weighted average evapo-transpiration (consumptive use) in feet for irrigated land and native vegetation is shown in the following tabulation::

Area	Annual evapo-transpiration, in feet						
	Normal		1943-44		1944-45		
	Irrigated:		Native		Irrigated:		Native
	land	vegetation	land	vegetation	land	vegetation	land
Pressure	1.69	3.81	1.67	3.77	1.70	3.83	
Eastside	1.87	4.51	1.85	4.46	1.88	4.53	
Forebay	2.17	2.68	2.13	2.63	2.16	2.67	
Arroyo Seco	2.12	3.10	2.08	3.05	2.11	3.09	

Santa Ana River Canyon.-Dean C. Muckel reports that evaporation records from five different stations in and near Santa Ana Canyon were computed for the 7-month irrigation seasons April through October. Because the records from these stations were for different years with some overlapping of record, it was necessary to adjust them all to the same period. Consequently all records were extended to the 15-year period 1931 through 1945 by using indices. It was found that the summer of 1944 had the lowest evaporation, being only 84 percent of the 15-year average. Results based on our 1944 field work to determine the consumptive use must therefore be adjusted to arrive at the long-time average use. The summer of 1945 was more nearly normal, being 97 percent of the long-time average.

Evaporation from Water Surfaces.-Arthur A. Young reports that search indicates availability of some 200 pan evaporation records in California, a majority of which have been collected for tabulation in the Pomona office. The longest continuous record is 35 years and many others from 15 to 20 years have been obtained. Most of the records are listed in areas where water for irrigation is not plentiful and storage reservoirs are a necessity. About 50 of the records tabulated are for Weather Bureau

pans, about 20 for the Colorado type square pan, and others are for various land and floating pans. Minimum evaporation occurs in Coastal areas and maximum evaporation in the Mojave Desert. A few of the southern California Weather Bureau-pan records found by Mr. Young are listed below:

Location	: Period of record :		Average annual evaporation
	Elevation : Feet	Years	
Henshaw Reservoir	2620	22	68
Chula Vista	9	27	60
Morris Reservoir	1210	10	54
Prado Reservoir	480	11	70
Yuma Citrus Station	181	24	106
Baldwin Park,	390	12	62
Riverside	1100	15	65
Hayfield Reservoir	1460	12	144

Seepage Losses Affecting Irrigation Practices.—Carl Rohwer reports further revision of the report on Seepage from Irrigation Channels and Methods of Prevention. Work was started on the computation of the result of the seepage measurements on one of the laterals on the College East Farm before and after lining. Canal lining and seepage-control problems were discussed with the agriculturist of the Holly Sugar Company from Sheridan, Wyoming. Seepage from one of the canals in their area has resulted in slides along the steeper slopes. Some suggestions were made to the engineer of a local Soil Conservation Service district regarding checks in a lined canal.

Control of Silting in Irrigation and Drainage Systems.—Dean W. Bloodgood reports completion and mimeographing of a report on "Silt Load of Texas Streams, Part VI (A Progress Report as of October 1, 1943 to September 30, 1944)" by himself and A. A. Meador, Testing Engineer. The report contains silt data for 21 active silt stations on 11 of the principal watersheds of Texas, also silt data for 17 inactive stations. Some of the active silt stations have been in continuous operation for as much as 17 to 20 years.

Data contained in the report will be useful in determining some of the silt problems of rivers and the silting of reservoirs. The Brazos River at Richmond during a 20-year period, contributed 505,666 acre-feet of silt (computed at 70 pounds of silt per cubic foot) -- a sufficient amount to fill a good-size reservoir. The Colorado River at the San Saba station (above a series of dams on the river) and for a 14-year period, contributed 49,266 acre-feet of silt. The Neches River at the Rockland station (East Texas) and for a 14-year period, contributed only 3,404 acre-feet. The Nueces River at Three Rivers station and for a 17-year period contributed 178,555 acre-feet.

Some of the silt that enters a reservoir area is carried over the spillways, through turbines, and through outlet gates of the dam. Of the amount of silt entering Possum Kingdom Dam at South Bend station for nearly a 3-year period (6,231 acre-feet) a total of 456 acre-feet is passed over the spillway or through openings in the dam. The amount of silt entering Lake Corpus Christi, which is located below the Three Rivers station, for 1941-44 was 1,300 acre-feet, while the amount of silt passing the dam for a 2.7-year period was 599 acre-feet.

Snow Surveys and Irrigation Water Supply Forecasts - Tests of Over-Snow Transport Machines. - Several tests were made by R. A. Work and W. T. Frost under low temperature conditions in central and eastern Oregon.

An effort to reach Waldo Lake failed when a ski on the Tucker Sno-Cat was broken on a snow-buried log. Thirty-eight miles of extremely difficult travel was accomplished on this trip between daylight and dark. Much delay was caused by fallen timber across the road. Both skis were greatly strengthened through addition of light-weight trusses. On a trip to New Dutchman Flat a good opportunity was given to observe comparative performance of the Sno-Cat and the Army Weasel on the same terrain. Snow slightly exceeded 10 feet in depth; top 4 feet or so was newly fallen within a few days. The Weasel with three passengers sank 12 inches; the Sno-Cat with four passengers sank 9 inches. Top speed of the Weasel on packed trail was 21 m.p.h. with three passengers. Top speed of the Sno-Cat with four passengers and trailer with two passengers was 25-26 m.p.h. In unpacked trail Sno-Cat speed on level terrain appeared to be about 2-1/2 times that of the Weasel. The Sno-Cat appeared generally more maneuverable and traveled successfully on side slopes which the Weasel could not traverse. The party completed in 6-1/4 hours running time a 56-mile trip to three snow courses on the Malheur River. Heretofore this trip has usually required 5 days for two men on skis.

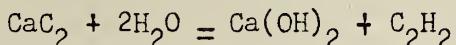
Imperial Valley Soil Moisture Studies. - V. A. Aronovici reports a careful check of the accuracy of the Toledo soil-moisture equipment, using fine loamy sand. The procedure was as follows: 100-gram samples of the oven-dried fine loamy sand were weighed out and placed in moisture cans. Water was added to each to obtain the desired moisture range. The samples were then allowed to stand for 24 hours. The data and results are outlined below:

<u>Sample No.</u>	<u>Water added</u> gms	<u>Base percent</u> Pw	<u>Toledo</u> Pw	<u>Oven dried</u> Pw
1	5	5.0	5.5	5.82
2	10	10.0	11.5	11.26
3	15	15.0	15.0	15.51
4	20	20.0	21.5	21.96
5	25	25.0	25.04	25.64
6	30	30.0	31.0	31.03

It is obvious from the above data that the Toledo unit is sufficiently accurate for field use in samples of texture grades of loamy sand and coarser. Checks have not as yet been completed on the heavier textured materials. It is probable the discrepancy between the base Pw and that measured was due to a slight pick up of moisture from the atmosphere during weighing and preparation.

Further check shows that these scales use approximately 28 grams of moist soil against 81 grams of active carbide. As there are never more than 14 grams of water present, the carbide to water ratio is always more than 5 to 1. However, when this is chemically balanced the ratio is not so great.

The reaction is as follows:



Molecular weight of the CaC_2 is 64 while that of the water is 18. This is a ratio of 3.55 to 1.0 and as indicated above the ratio of the total possible water present in the soil to the total carbide used is more than 5 to 1.

The main possibility of error is most likely in the heavier textured soils where thorough contact of the soil with the carbide is difficult. The most apparent fault of the Toledo unit is the lack of a balance stop. This greatly slows down weighing and increases chance of error in weighing carbide and soil.

Parshall Flumes for Carbon and Price Canals. -Ralph L. Parshall reports completion of a practical design for a wooden portable form for casting 9-inch reinforced concrete Parshall measuring flumes. This form is intended for use at Price, Utah, in the rehabilitation of the distribution of water from the Carbon and Price canals. The building of the form and consultation in connection with this water-measuring problem at Price is for the Soil Conservation Service district office at Price. It is expected that a metal form for casting 3-inch flumes will be sent to Price where these small structures will be pre-cast and then transported and set in the farm laterals where desired.

Escondido and Pomerado Soil Conservation Districts. -Dean C. Muckel and Harry F. Blaney conferred with officials of these districts and with District Conservationist Sikes regarding requested water-supply studies. The study in the Escondido district would involve the determination of the safe yield from ground-water sources of Escondido Valley and the possibility of recovering seepage losses from the irrigated area south of the town of Escondido. Most of the area is now irrigated by water imported by the Escondido Mutual Water Company. The water resulting from deep percolation on irrigated lands has accumulated in the lower part of the valley to such an extent that the water table is too near the ground surface for successful farming. It is proposed that wells be

sunk in order to utilize this water and at the same time reclaim the valley lands. Because there is danger of overdeveloping the ground-water supplies the safe yield over a period of years is desired. The storage capacity of the ground-water basin is not sufficient to carry over all of the water from wet years to dry years. On the irrigated area south of the town of Escondido excess water from irrigated lands is now escaping towards Lake Hodges and a study is desired to determine whether this water can be intercepted by wells. Some wells have already been sunk and have proven successful but a balance between imported and pumped water must be maintained. The study requested in the Pomerado District would involve the determination of the safe yield of many small valleys. The water-bearing material in most cases is relatively shallow and development of large wells seems to be infeasible. There are a few existing wells for domestic, stock, and small irrigated fields, but it is doubtful that enough information is available to permit a complete water-supply study. It is definitely an area of small water supply with the irrigable acreage far exceeding the amount of water which can be developed locally.

SUPPLEMENT TO
SUMMARY REVIEW OF MONTHLY REPORTS

DRAINAGE AND WATER CONTROL DIVISION

Runoff Studies - H. K. Rouse, Colorado Springs, Colorado.-"During January two new rating tables were prepared to cover the changing conditions caused by accumulations of silt in the pondage area of Watershed W-I, Colorado Springs. Computations of runoff for all stations at Colorado Springs were completed. The following maximum rates of runoff were recorded on these watersheds during 1945:

W-I (10.6 acres, cultivated)	4.15	in.	per hr.
W-II (40 acres, native pasture)	1.12	"	"
W-III(35 acres, " "	1.32	"	"
W-IV (35 acres, " "	1.64	"	"

"For Watershed W-I, W-II and W-III, these rates are the highest recorded during eight seasons of observation while for Watershed W-IV, the rate has been exceeded only once.

"Amounts of runoff were also the largest for any of the 8 years of record for the same three watersheds and second largest on Watershed W-IV.

"The amount of runoff on Watershed W-I was more than double the amount recorded in 1938, the next highest year and on Watershed W-II, the amount recorded was greater than the total runoff during the 7 previous years.

"The analyses of the data collected at the field test of certain irrigation practices in the Fountain Valley Soil Conservation District near Colorado Springs, Colo., have been completed and a report has been prepared by the undersigned in collaboration with Mr. Floyd E. Brown, Specialist in Irrigation Practice, of the Colorado Agricultural Experiment Station and Mr. Roger D. Headley, State Soil Scientist of Fort Collins. This field test was conducted on a deep, medium-textured soil, tentatively classified as Fort Collins sandy loam and investigated two systems of light application and two systems of heavy application of irrigation water. The conclusions reached are based on but one investigation, carried on during one season and are influenced by abnormal climatic factors differing to some extent from those ordinarily encountered in irrigation practice.

"Under climatic and soil conditions similar to those under which this investigation was made:

1. The maximum efficiency in the use of irrigation water and labor in the production of sugar beets is attained using only sufficient water at each irrigation to 'wet across' between rows, (a net application of from 2.5 to 3.0 inches) with the first irrigation deferred until plants begin to droop and show need for water.

2. Increases in the amount of water used at each application will not result in significant increases in yield.
3. Increases in the amount of water used at each application will not result in significant increases in the amount of water in the soil profile extending 4 feet below the surface.
4. Increases in the amount of water used at each application increase:
 - (a) loss of water by runoff.
 - (b) loss of water, with dissolved nutrients, by deep percolation.
5. Irrigation at dates earlier than when the plant shows need for water will not result in significant increases in yield.
6. Land levelling operations involving the removal of top soil will not result in significant decreases in yield when the maximum cut does not exceed one foot, providing adequate tillage operations are performed and suitable additions of manure and commercial fertilizers are made."